Lifestream
RESOURCES
Designed by miners for miners

Mine Communications and Tracking System

- Lifestream Resources offers a complete Communications and Tracking System compliant to the requirements of the 2006 Miner Act

- In addition, the Lifestream system provides an array of useful tools to improve all aspects of daily operations by virtue of a mine wide IP network - simply stated, an opportunity for enhanced mine efficiencies, safety, performance and – Return on Investment (ROI)

Lifestream System Composition
Simple and Powerful

- **Wireless Nodes**
- **Wireless Network**
- **Handheld Device**
- **Monitors and Surface Servers**
- **Ancillary Wireless Devices**

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Typical in-mine wireless node installation

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Lifestream System Composition
Wireless Network

- High capacity, low latency wireless network for surface and underground deployments.
- Bandwidth of network exceeds 250meg; typical mine fiber speeds are 100meg.
- Imparted latency of network is less than 1ms per node. Overall end to end network latency is less than 33ms, negligible in network terms.
- Surface link distances in excess of 40km are typical, line of sight.
- Underground link distances vary from 150m to over 1,000m.

Lifestream System Composition
Wireless Network Hardware

- Typical deployments consist of a small wireless router and its dedicated battery backup unit.
- The wireless node is small and compact measuring approximately 22cm X 17cm X 9cm and weighing 2kg.
- Battery backup modules are 22cm X 17cm X 15cm and weigh 20kg.
- The battery backup provides a minimum of hours of runtime for the network (including ancillary devices).
- Surface and underground installations are nearly identical.

Lifestream System Composition
Wireless Network Operation

- The Lifestream system creates a large scale mesh network with an unlimited number of nodes.
- The network is designed with 'redundancy nodes' which provide for alternative paths within the network.
- The routing software constantly monitors itself and automatically re-routes the network around broken or even just degraded links.
- Network convergence is extremely fast.

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Wireless signal penetrating metal and concrete stoppings

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Heavily obstructed areas in the wireless network

Castle Valley Mine – Huntington Utah

- Network is 100% wireless
- Network distance approximately 15 miles; Contains 80 nodes: 7 above ground and 73 in-mine.
- AMS System with over 30 sensors.
- Beltline monitor and control; Coal loadout monitor and control
- 'Standard' node spacing on beltline is 200m; open entry spacing 300m'.

Castle Valley Mine – Huntington Utah

- Provides excellent voice coverage and tracking accuracy ~25m.
- Latency of ~33ms over greatest extent of network; negligible in network terms.
- Phone call quality from back of mine to any location, in or out of mine, is better than typically found in a cell to cell call.
- Video monitoring of beltlines, loadouts, and warehouse facilities.

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Base Station at Internet Connection

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Mountain Solar Relay Link to Mine

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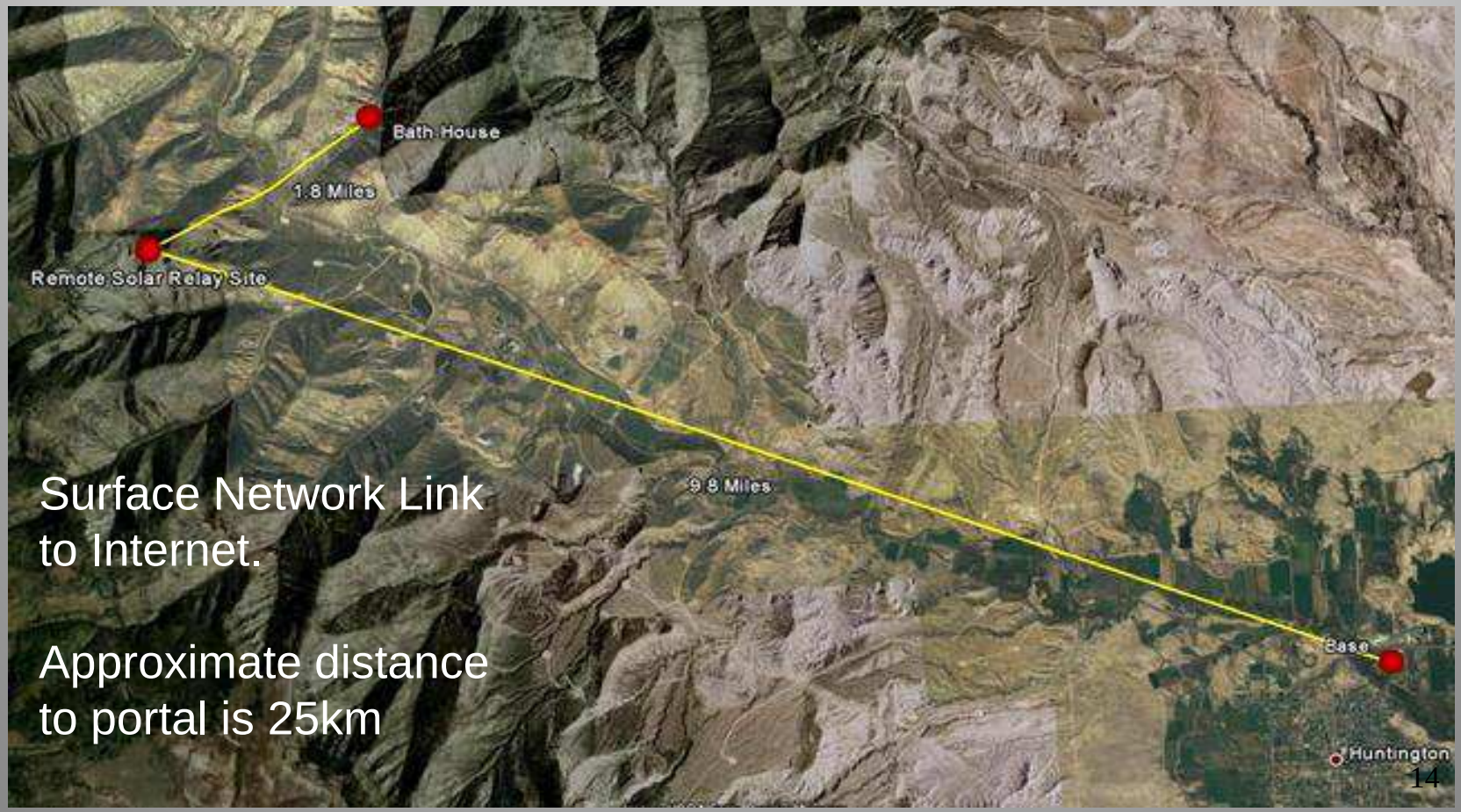

Surface Network Link to Internet.

Approximate distance to portal is 25km

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Mountain Relay to Mine Portal

Lifestream System Composition
Wireless Network Hardware

- Power is provided to Lifestream devices from existing mine power (power center) to LS power distribution boxes.
- Each power distribution center can handle up to 6 Lifestream devices.
- Input voltage is 220VAC; output voltage is 24VDC.
- Typical input cable is 12/3 SOOW; output cable is 18/3 SJOOW.
- Each power distribution center and cable connectors are IP67 rated.

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Fast and easy system power installation

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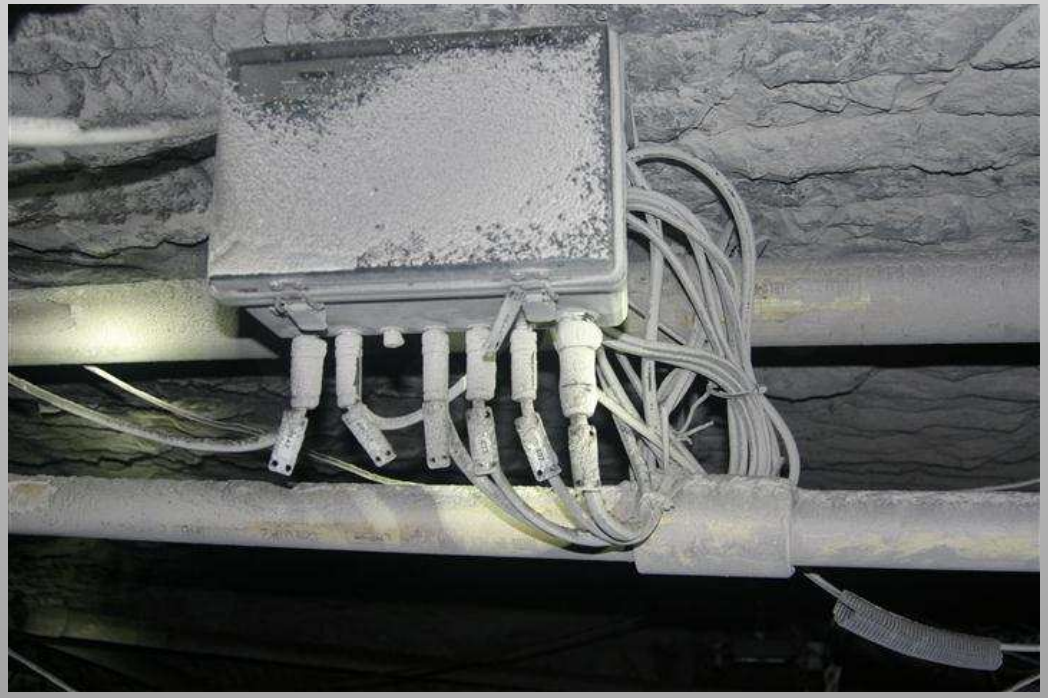

Durable and IP67 rated

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Lifestream System Composition
Handheld Device

- Fully Wireless GSM / 802.11b/g/n (mimo)
- Integrated GPS option for surface tracking
- Integrated camera
- High capacity 2000mAh battery with easy recharging station

- Lifestream OS Linux based operating system
- Endless number of custom apps possible
- Rugged Mil Spec and IP68 rated device
- Small 14cm X 7cm X 2.5cm device;

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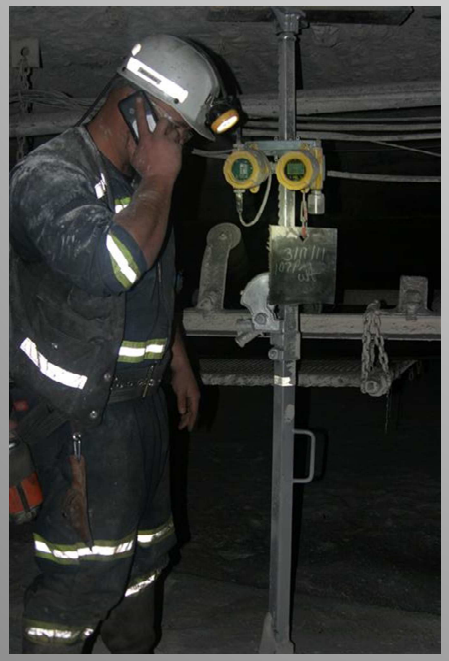
Lifestream System Composition
Handheld Device



Easily place calls or text/email on right sized device

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Lifestream System Composition
Handheld Device

A successful call to Santiago Chile

Lifestream System Capabilities & Uses
Wireless Network

- Provides coverage of as much of mine property as desired, above ground as well as underground.
- Integration of remote computers and devices into overall mine network.
- Long distance links easily accomplished with remote solar relay sites over distances greater than 40km line of sight.
- Create remote 'hot spots' for network access and communication in isolated locations.

Lifestream System Capabilities & Uses
Integrated Communications

- The voice communications system operates over a high capacity Voice over IP server.
- Provides communications throughout the mine property wherever there is network coverage, over both the wireless and wired networks.
- Fully integrates with any incoming telephone lines and internet connection.
- Capable of providing complete telephone system for the mine, above and below ground.

Lifestream System Capabilities & Uses
Integrated Communications

- Includes full voice, data, and video communications capabilities.
- Calling rights are mine defined by person; each handheld capable of calling any phone on the mine property, and any other phone number in the world.
- Full phone system includes conference calling, group calling, emergency operation mode, voice mail, texting, and email.

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Lifestream System Composition
Surface Server

- Fully redundant blade server system.
- Redundant blades, power supplies, and RAID array.
- Single seat, multiple monitor work station provides network management, tracking, and voice management in single rack mount server.
- Exception based reporting simplifies operation and reduces headcount requirements.

Lifestream System Capabilities & Uses
Miner and Asset Tracking

- Track miners and mine assets such as vehicles and high value components in real time throughout the mine.
- Tracking accuracy is dependent on the number of wireless nodes. Accuracy levels can range from 10m to general zone based accuracy of 250m or more.
- Tracking data is stored on the surface server and the location of every tracked miner or asset is kept for as long as the mine desires.

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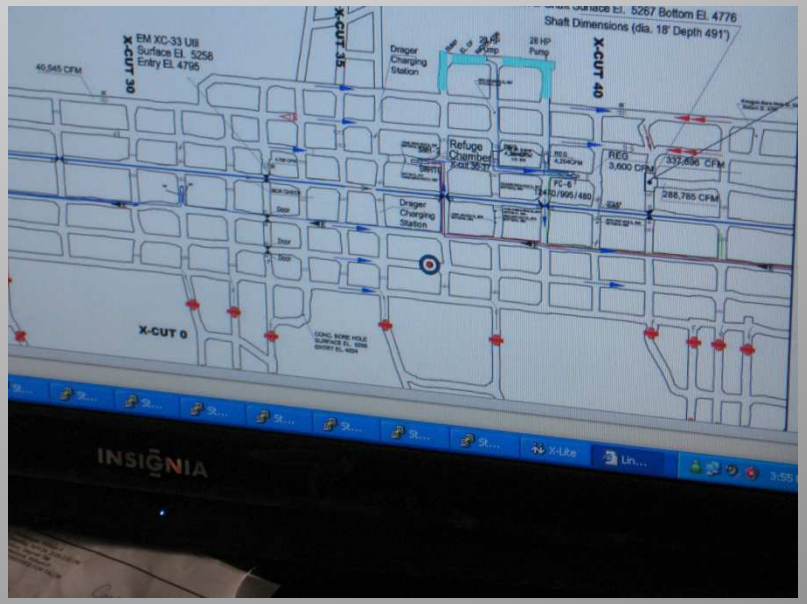
Lifestream System Capabilities & Uses
Miner and Asset Tracking

- The last known location of a miner is always displayed on the management server.
- As many or as few 'targets' can be displayed at any time.
- Clicking on the target displays identification data – mine defined.



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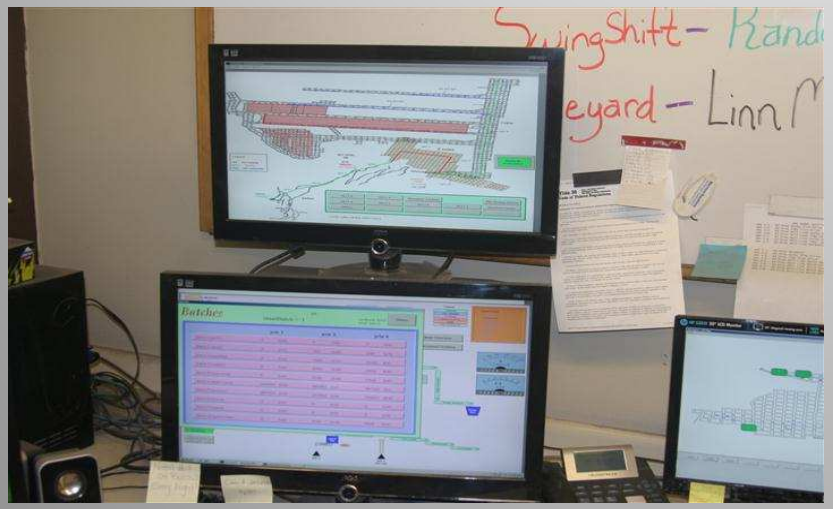
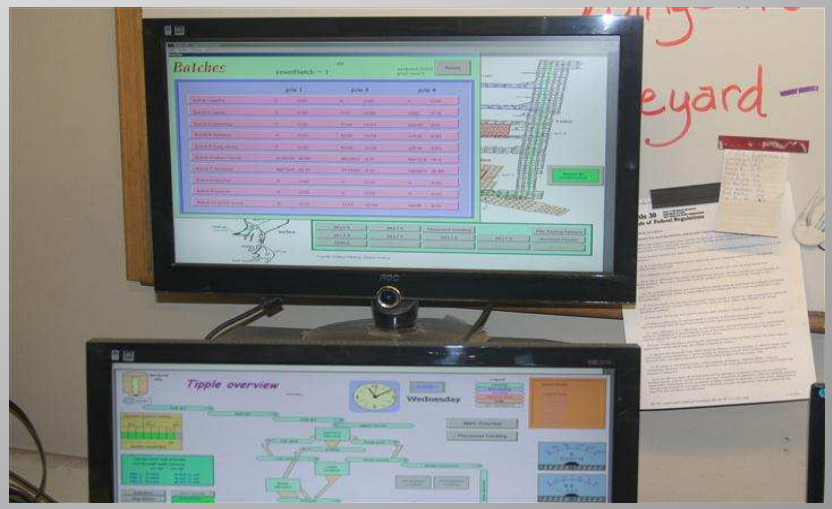
Lifestream Control Center





- Constant real time network status of every device
- Integrated monitoring of network power including battery backup
- EXCEPTION BASED reporting alerts

Lifestream Ancillary Wireless Devices

- Atmospheric Monitoring (AMS)
- Refuge Chambers
- Seals
- Video
- Process Control

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Lifestream System Capabilities & Uses
Atmospheric Monitoring

- Fully Wireless with battery backup.
- Sensors for complete range of gases present in underground mines.
- Technological advantages over other AMS systems in the market.
- Real time dust monitor

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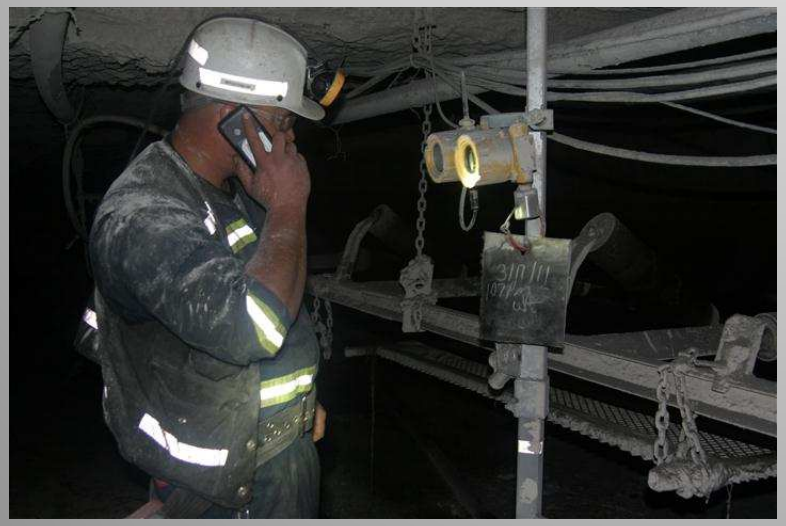
Lifestream System Capabilities & Uses
Atmospheric Monitoring



Real time atmospheric monitors – fully wireless and easy to install

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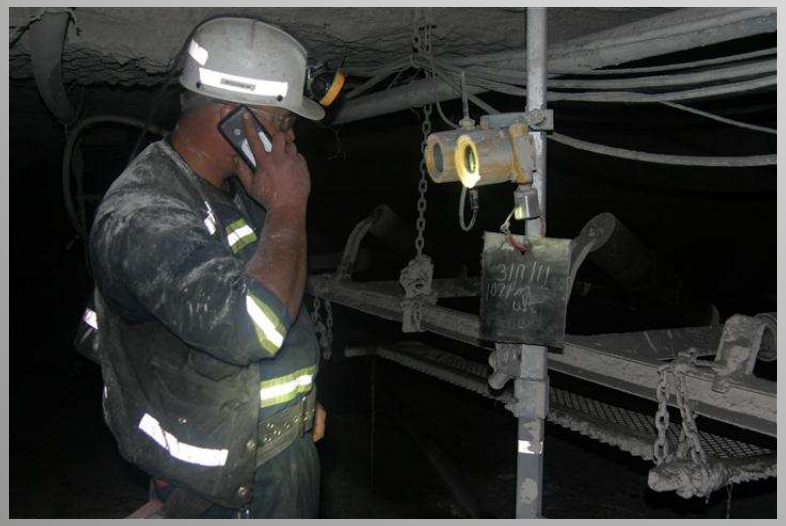
Lifestream System Capabilities & Uses
Atmospheric Monitoring



Real time atmospheric monitors – fully wireless and easy to install
1st and 2nd Generation of Atmospheric monitors
3rd Generation Monitors March of 2012

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Atmospheric Monitoring
Underground Refuge Chambers

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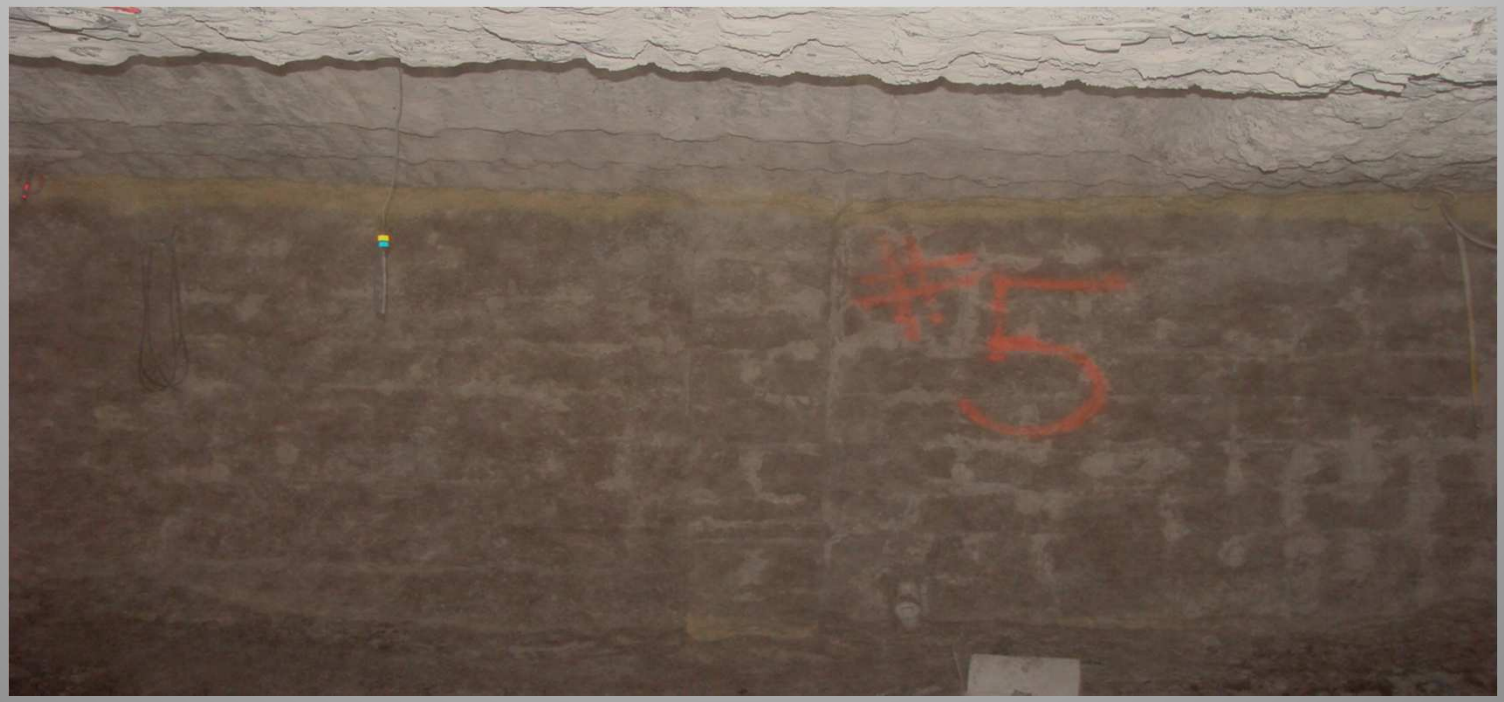
Atmospheric Monitoring
Mine Seals



3rd Generation of Atmospheric Monitoring

- Will monitor up to 6 gases with one display
- Full range of gas monitoring capability (0-100%)
- Internal air pump
- Compact and durable : 4" x 4" x 6"
- 6vac
- Ability to monitor temperature
- Ability to monitor pressure (barometric pressure)

Lifestream System Capabilities & Uses
Video Monitoring

- High quality video of important locations within the mine.
- Integrated video display in the management server of the system.
- Digital video recording of any cameras on system

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Lifestream System Capabilities & Uses
Video Monitoring

Wireless IP Camera installation at an ore dump (IR camera- no external light required – 100% wireless)

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Lifestream System Capabilities & Uses
Mine Monitoring – Process Control

- Integrated monitoring of all process control operations in the mine e.g.:
  - Belt lines
  - Loadouts
  - De-watering operations
  - Ventilation control
  - Fire and emergency management
  - Production operations

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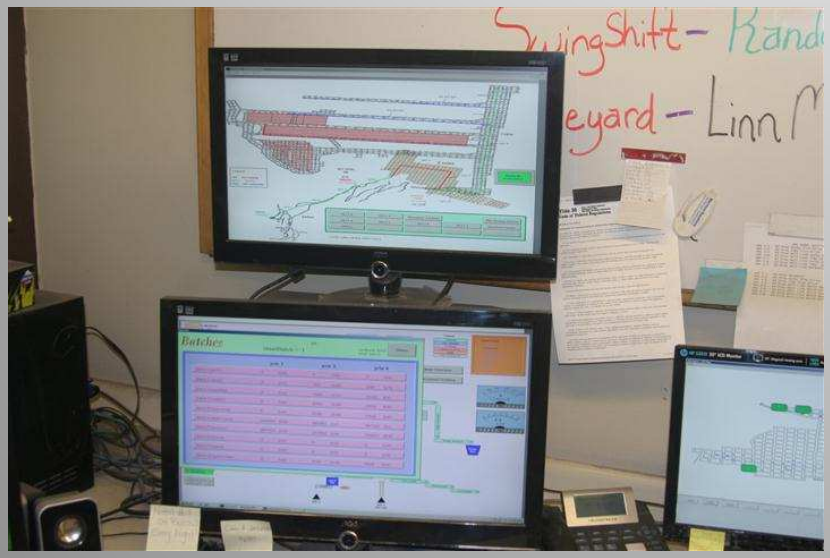
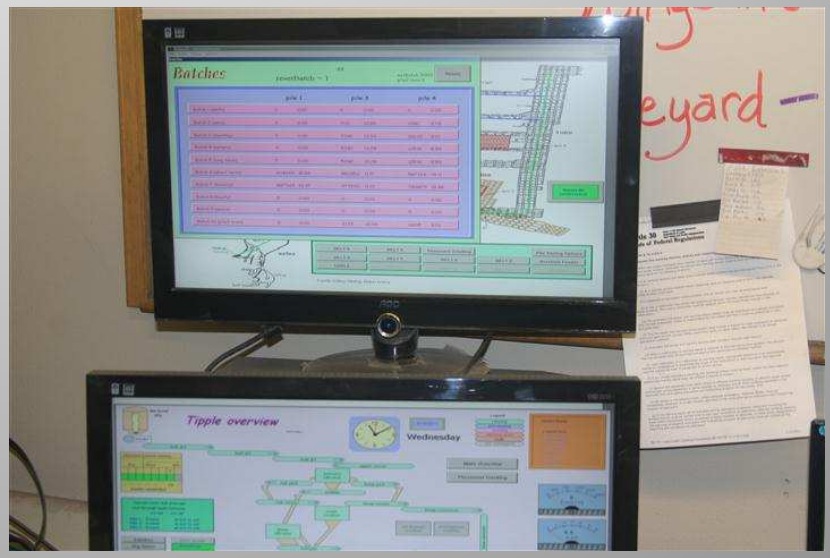
Lifestream System Capabilities & Uses
Mine Monitoring – Process Control





Belt monitor and control display – all belt operations via Lifestream

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Lifestream System Capabilities & Uses
Mine Monitoring – Process Control

Lifestream systems control belt, tipple, and loadout operation

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